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Abstract

This paper analyzes the process of industrial diversification in the EU-27 and ENP countries in the period 1995-2010 by means of world trade data derived from the BACI database (elaborated UN Comtrade data). Our results show that in both the EU-27 and the ENP countries, the evolution of the export mix is strongly path-dependent: countries tend to keep a comparative advantage in products that are strongly related to their current productive structure, and they also diversify in nearby products. However, this effect is much stronger for ENP countries, signalling their lower capabilities to diversify in products that are not very near to their productive structure. We also show that the future export structures of countries are affected by their imports: both the EU-27 and ENP countries keep a comparative advantage in products that are strongly related to their imports, but only EU countries show a strong capability to diversify in new products from related import sectors. Our results also hold when controlling for geographical and institutional proximity.

JEL Codes: F19; O14; O33.
Keywords: diversification; relatedness; European Neighborhood Policy; trade

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Introduction

The evolution of the productive structure of countries is a relevant topic from both an academic and policy point of a view. The wealth of countries depends on the richness and complexity of their products, but there is a strong heterogeneity in what they produce. The traditional paradigm of trade theory suggests that this heterogeneity should reflect underlying characteristics of countries, i.e. factor endowments or productivity. However, recent developments in the international trade literature question this paradigm by showing that the current productive structure of a country is affected by its own past productive structure, through a path-dependent process governed by the relatedness between products (Hausmann and Klinger, 2007). Relatedness matters because the product space is very heterogeneous and it has a core-periphery structure (Hidalgo et al., 2007). This implies that jumping into new products is far from easy and straightforward, as it requires specific capabilities that are not easily transferred across countries: if a country does not have most of the capabilities needed to produce a new good, it can be very difficult to start producing it (Hidalgo and Hausmann, 2009).

In this paper, we propose two contributions to this relatedness and diversification literature. First, we claim that the path-dependent process of product diversification is driven not only by each country past productive structure, but also by its relationships with other countries: countries are not isolated monads, but are embedded in several networks through different channels, such as geographical proximity, political relations and international trade. Jumping into new products because of these relationships might be more convenient, because of stronger economic incentives, or just easier, because of learning opportunities.

Second, we claim that the constraints of path-dependence are not equally binding for all countries. Capabilities may refer to very different domains: they include tangible inputs, such as infrastructure, or intangible ones, such as knowledge and institutions. However, while some capabilities are important only for specific products or groups of products (e.g. specific technological knowledge), there are also general-purpose capabilities that are relevant for all products, and are also country specific (e.g. institutions favoring or hindering entrepreneurship). Countries characterized by stronger general-purpose capabilities could find it easier to jump to any new product: therefore, the importance of product relatedness would be much lower in this case. On the contrary, countries characterized by weaker general-purpose capabilities would rely much more strongly on the links between products in order to jump into new industries. Similar considerations can also apply to learning: while some learning is certainly product specific, a more general absorptive capacity might differ across countries. Therefore, countries with higher learning capabilities might be better able to exploit their network relations to diversify into new products.

We will test these ideas by investigating the process of industrial diversification in the EU-27 and ENP countries for the period 1995-2010. We will make use of world trade data that are derived from the BACI database (elaborated UN Comtrade data). Our results show that the evolution of the export mix is strongly path-dependent: countries tend to keep a comparative advantage in products that are strongly related to their current productive structure, and they also diversify in nearby products. This effect is much stronger for ENP countries, signalling their lower capabilities to diversify in products that are not very near to their productive structure. We also show that the future export structures of countries are affected by their imports: countries keep a comparative advantage in products that are strongly related to their imports, but only EU countries (and not the ENP countries) show a strong capability to diversify in new products from related import sectors.

In the next section, we present the theoretical framework. Then we illustrate the methodology and the data. In the subsequent section, we present descriptive and econometric analyses. We conclude by discussing the policy and theoretical implications.

The structure of the product space, diversification and relatedness

A striking characteristic of modern economies is the rich variety of the products they are able to provide. Some of the founding fathers of the economic science (Smith, 1776; Young, 1928) recognized that not all products are equal and they may have very different effects on the growth of countries. Only recently, though, economists have been able to provide a more precise and formal account of these ideas. By using international trade data, Hidalgo et al. (2007) drew a map of the product space and showed that some products are in a dense part of this map - that is, they are related to many other products - whereas other products are in the periphery of the map. Moreover, they also showed that countries specialized in products in the dense part of the product space have higher growth rates than countries specialized in more peripheral products.

Two causal mechanisms have been put forth to explain these empirical results. Hausmann and Klinger (2007) developed a model of product-specific human capital, with heterogeneous degree of substitutability across products and overlapping generations. In each period, there is a young untrained worker who does not produce, but is trained by the old worker in the specific product the old worker is specialized in. Moreover, the old worker can choose whether to stick to the product in which she was trained in the previous period or to jump to an alternative good for which her product-specific training is an imperfect substitute. Given the marginal increase in revenue by unit of distance between products *f* and the following quadratic cost function:

$$C(\delta) = \frac{c \cdot \delta^2}{2}, \qquad (1)$$

it is possible to determine the optimal distance to jump, which is:

$$\delta^* = \frac{f}{c} \qquad (2).$$

If the product space is not continuous, but discrete, three immediate implications follow from this simple specification. First, at the optimal distance, there could be no product and the workers might be forced to adopt non-optimal solutions. Second, since the profits from jumping first increase and then decrease with distance, there could be no product such that jumping is convenient for the worker: in this case, she keeps producing the old one. Third, generalizing the model, workers (countries) located in areas where products are more dense, will have higher opportunity to jump to new products, and therefore to grow.

An important assumption of this model is that workers might differ only in their specialization: both the revenues and the costs are the same for all workers. However, suppose there is heterogeneity among workers with respect to one of these dimensions (e.g. costs). Let worker *i* have higher costs than worker j (that is, $c_i > c_j$), then the optimal distance to jump will be higher for worker j (that is, $\delta_j^* > \delta_i^*$). Therefore, the two workers will probably end up in specializing in different products, and the impact of distance on the diversification and branching process will be much stronger for the worker (country) that has the higher costs.

The second causal mechanism refers to the concept of capabilities. Capabilities might refer to different levels of analysis. At the firm level, they identify complex routines or collection of routines that give an organization a set of options for producing specific outputs (Winter, 2003). They are an important source of firms' competitive advantage because they cannot be easily imitated (Dosi, Nelson and Winter, 2000). At the country level, they refer to specific infrastructure, skills, knowledge, institutions or norms that represent advantages for countries because they are not internationally tradable (Hausmann and Hidalgo, 2010). If a country is specialized in a certain product, it clearly has the capabilities to produce it, as well as most of the capabilities necessary to produce similar products. Therefore, countries specialized in products located in the dense part of the product space will have more opportunities to redeploy their capabilities in new products and will have higher growth rates. Recent empirical evidence indirectly confirms the role played by capabilities in the diversification process. Industry case studies show that the most successful firms in new industries are founded by entrepreneurs with experience in related industries: many carriage-makers were able to redeploy their experience in complex assembly in the newly born automobile industry (Klepper, 2002), and the dominant firms in the radio industry were also able to dominate the television receiver industry (Klepper and Simons, 2000). Boschma et al. (2013) show that the diversification process is stronger at the regional than the country level, which is compatible with the concept of non-tradable and localized capabilities. Evidence is accumulating that relatedness is a key driving force of diversification at the regional scale (i.e. the sub-national scale) in countries like Sweden (Neffke et al. 2011) and the US (Essletzbichler 2013).

An important difference between the capability perspective and the previous model is related to the heterogeneity between countries. Countries differ in the capabilities they have and these differences will affect the diversification process as much as the distances between products. Still, this heterogeneity between countries does not imply also a different effect of distance across countries, because the effect of distance is driven exactly by the heterogeneity in the capabilities, which refer to the specific characteristics of products. What if there are some capabilities that are not related to specific products, but to all products? General-purpose capabilities can be country-specific rather than product-specific. The diversification process in countries with strong general-purpose capabilities will be less affected by the existence of product-specific capabilities. However, in countries with weak general-purpose capabilities, the only way to move to new industries would require to exploit the existing product-specific capabilities.

An example might be useful to clarify this concept. Consider two countries A and B, where A has stronger general-purpose capabilities. Let F be a biotechnology company specialized in cancer diseases. If the company discovers a new drug related to a different type of cancer, then it will be profitable to exploit it both in country A and in country B. However, if the new drug refers to a quite different domain (say, organ transplant rejection), it would be much easier to exploit it if F is located in country A, where differentiation in distant markets is less costly. Moreover, even if F does not exploit the innovation directly, if in country A there are effective markets for technology (Arora et al., 2001) or favorable conditions for the creation of spinoffs (Klepper, 2007), we will observe that country A diversifies in the new product, whereas this would not happen in country B.

So, our first claim is that the path-dependent process driving the diversification into new industries might offer different degrees of freedom in different countries. In countries where general costs are lower and general-purpose capabilities are stronger, we will observe a lower role for distance or relatedness between products, whereas in countries with higher costs and weaker capabilities, we expect to observe the opposite pattern.

A natural follow-up question is to ask whether there is any other condition that might reduce the strength of path-dependence in the diversification process. The productive structure of a country is affected by its own past history, but is also embedded in a network of relationships. It is certainly possible that these relationships can exert some influence on the direction and the intensity of the diversification process. Here we will consider in detail trade relationships, geographical proximity, and colonial relations, although other types of links might be also relevant. For example, Boschma et al. (2013) consider the effect of other (neighbouring) regions within the same country.

In the theoretical literature on international trade, it is not uncommon to find references to the possibility of learning from exports and imports (see e.g. Redding, 2010). At the empirical level, though, there is quite a lot of variation. Macro-level studies refer to the effects of trade on productivity and growth of countries (Singh, 2010) or regions (Boschma and Iammarino, 2009), and then they infer that some learning might explain the observed outcomes.

More details on the mechanisms can be found in micro-level studies (Wagner, 2007, 2012). A well documented stylized fact is that firms engaging in exports have higher productivity: empirical evidence shows that this is at least partially due to self-selection of better firms into exporting behavior (Lileeva and Trefler, 2010). There is much less consensus on the existence of ex-post effects: some studies tend to suggest economies of scale explanations rather than learning (Silva et al., 2012), but there is also evidence of learning when using innovation measures (patents) rather than productivity (Alcacer and Oxley, 2014).

However, the situation is reverted in the case of imports: there is limited evidence for self-selection in importing activities, because of fixed costs (Altomonte and Békés, 2010), while much more convincing is the case for indirect forms of learning (Castellani et al. 2010). In fact, importing firms may exploit the availability of more variety in inputs and also the possibility that imported products embody higher quality. These processes are feasible even when absorptive capacity by firms is missing (Cohen and Levinthal, 1990), because characteristics embedded in products do not require actual learning by firms. However, they might not be profitable in all countries: the availability of fitter and higher quality inputs can be exploited only when there is a demand (internal or foreign) that is sensitive to these issues. Otherwise, imports will have no impact on the probability of moving into new products. Imports might also operate on diversification through channels other than learning. Strong imports in a sector signal relevance of this sector for the productive structure of a country, and therefore provide a strong incentive for firms in the country to move into it. Still, if production was not occurring before, the required capabilities should be developed and this could be more difficult when suffering from strong international competition.

More generally, trade relationships might also signal other type of links between countries, such as mobility of workers or cultural similarities, that could also favor learning opportunities or provide pressure to remain active in sectors that were already well developed in the past. This is the reason why we also consider geographical and cultural proximity.

The importance of geographical proximity is explained by the famous first law of geography: “everything is related to everything else, but near things are more related than distant things” (Tobler, 1970). More specifically, capabilities diffuse usually at quite a short range, because they are essentially based on tacit knowledge (Polanyi, 1962) that can be transmitted through mechanisms of social interactions, such as the mobility of workers (Almeida and Kogut, 1999; Breschi and Lissoni, 2009). Recent empirical evidence shows that distance matters also for the evolution of the productive structure of countries and their diversification paths (Bahar et al. 2012). Geographical proximity is also important as a control variable to examine trade relationships, since it is well known that trade is more intense at short distances (Leamer and Levinsohn, 1995), a finding which is confirmed for the EU-ENP countries (Petrakos et al., 2013).

We also consider the role that common culture can play, and in particular the existence of a colonial relationship between countries in the past. The colonial experience can have important and longlasting effects on the economic performance of countries (Acemoglu et al., 2001). In our particular case, the presence of institutions developed by the colonizers or the diffusion of the language of the colonizing country, might ease the transfer of tacit knowledge between two countries and therefore favor the diversification into products already present in the other country.

Summing up, our second claim is that the evolution of the productive structure of countries is affected by institutional variables, geographical proximity, and international trade relationships. As for the last element, we will focus on imports, but we will also look at the impact of the productive structure of countries embedded in the trade network, that is of origin and destination countries.

Methodology and Data

In order to represent the product space, we follow closely the approach outlined by Hidalgo et al. (2007) and Hidalgo and Hausmann (2009). Our starting point is the concept of comparative advantage developed by Balassa (1965). A country has a comparative advantage in a product *i* when the share of this product in its exports is larger than the share of the product in the world exports. We can easily compute the number of products in which each country has a comparative advantage. Formally, we can write this number as:

$$\pi_{c,t} = \sum_{k} x_{k,c,t} \qquad (3)$$

where *x* takes the value of 1 if country *c* has a comparative advantage in product *k* at time *t*, and zero otherwise. Analogously, we can also define the number of countries that have a comparative advantage in exporting a certain product:

$$\nu_{i,t} = \sum_{n} x_{i,n,t} \qquad (4).$$

We can use these two measures to define an indicator providing more information on the characteristics of the products, and in particular of their complexity. Consider a country *c*, which has $\pi_{c,t}$ products. Then

$$\xi_{c,t} = \frac{\sum_k x_{k,c,t} \cdot \nu_{k,t}}{\pi_{c,t}} \qquad (5)$$

is the average number of countries that have a comparative advantage in the products in which also country *c* has a comparative advantage. A high value of $\xi_{c,t}$ means that many countries are able to produce the same products of country *c*, which signals that the products in which this country is specialized are not very complex and do not require specific capabilities. On the contrary, a low value of $\xi_{c,t}$ is an indicator of high complexity of the productive structure of country *c*. In the network jargon, if we consider international trade as a bipartite network where countries and products are nodes and comparative advantage is a link, $\xi_{c,t}$ is the average nearest neighbor degree.

The next step in building a product space requires a measure of the proximity between industries. The proximity (φ) between two products (*i* and *j*) in a given year *t* can be formally expressed as:

$$\varphi_{ijt} = min\{P(x_{i,t}|x_{j,t}), P(x_{j,t}|x_{i,t})\} \qquad (6)$$

that is, the proximity between product *i* and *j* in year *t* is the minimum between the conditional probability of having a comparative advantage in product *i* given a comparative advantage in product *j*, and the conditional probability of having a comparative advantage in product *j* given a comparative advantage in product *i*. The rationale behind the proximity measure is that if two products are related because they require similar institutions, infrastructure, productive inputs, organizational routines and capabilities, and technology, they are more likely to be produced together in the same country. Conditional probabilities rather than joint probabilities must be used, so that the measure is not affected by the relevance of the products in world trade. The minimum between conditional probabilities is used in order to ensure a symmetric and conservative measure.

Proximity is a property referring to the link between two products. In order to analyze countries, we need to place them in this space. This can be done by using a density indicator, that measures how close a product is to the current productive structure of a country. Formally, density can be expressed as follows:

$$d_{i,c,t} = \frac{\sum_k x_{k,c,t} \cdot \varphi_{i,k,t}}{\sum_k \varphi_{i,k,t}} \qquad (7)$$

where φ represents proximity (between product *i* and product *k*), and *x* takes the value of 1 if country *c* has a comparative advantage in product *k* at time *t*, and zero otherwise. So, density around product *i* will be high if a country has a comparative advantage in most of the products related to the focal one. At the very extreme, it will be equal to 1, if a country has a comparative advantage in all products with a non-zero proximity to the focal product. Conversely, density around product *i* will be low (zero) if a country does not have a comparative advantage in most (any) of the products related to the focal one.

To measure the role of imports, we adapt the density indicator and develop an import density indicator. The formal definition is analogous to the definition of density:

$$id_{i,c,t} = \frac{\sum_k m_{k,c,t} \cdot \varphi_{i,k,t}}{\sum_k \varphi_{i,k,t}} \qquad (8).$$

However, here *m* takes the value of 1 if product *k* has a higher share in the imports of country *c* than in the world imports (we could say if country *c* has a comparative "advantage" in importing product *k*), and zero otherwise. So, import density around product *i* will be high if a country has a comparative "advantage" in importing most of the products related to the focal one. Conversely, import density around product *i* will be low if a country does not have a comparative "advantage" in importing most of the products related to the focal one.

To take into account the role of trade relationships with other countries, we employ two different strategies. First, we consider the most preferred countries in the trade relationships (Pinna, 2012), since the evolution of their productive structure might have important effects on the trade partners.

We use the comparative advantage of both the most preferred origin (the country with the highest share in the focal country-industry imports) and the most preferred destination (the country with the highest share in the focal country-industry exports). Second, we specify a more detailed measure by considering all trade relationships. Rather than considering only one country, we use a weighted sum of the comparative advantage indicator of all the partner countries. The weight is given by the share of the partner country in the imports (exports) of the focal country-industry. Formally, the weighted comparative advantage indicator *wca* can be expressed as:

$$wca_{i,c,t} = \sum_{b} \frac{M_{i,b,t}^{c}}{M_{i,t}^{c}} \cdot x_{i,b,t} \qquad (9)$$

where $x_{i,b,t}$ is the comparative advantage indicator of country *b* in product *i* at time *t*, $M_{i,b,t}^{c}$ is the value of country *c* imports of product *i* from country *b* at time *t*, and $M_{i,t}^{c}$ is the total value of country *b* imports in product i. In the case of destinations, exports values are used instead of imports values. The weighted measure has a clear advantage with respect to the previous one (most preferred countries), because it is more detailed and it exploits all the available information, but it is also more difficult to provide an interpretation of its effects.

In our model, we consider two forms of geographical proximity: sharing a border and simple distance between capital cities. In both cases, we use the comparative advantage of a proximate country. However, for each product category, we choose the country that has the highest comparative advantage ratio among the closest countries, that can be either all countries sharing a border[1], or the four nearest countries according to the mentioned distance. We use a similar indicator also for the colonial relationship. In this case, the comparative advantage is selected among all the countries that had a colonial link with the focal country.

In order to calculate all indicators we described so far, we use country-level world trade data from the BACI database for the period 1995-2010 (Gaulier and Zignago, 2010). This database is developed from UN Comtrade data using a procedure that reconciles the declarations of the exporter and the importer, allowing to extend considerably the number of countries with available trade data, including many countries in the European Neighborhood Policy group. Moreover, data are available at a high level of product disaggregation (6-digit Harmonized System), although for the current analysis we use a 4-digit level, which includes 1,241 different products[2]. We also use bilateral data about the distance between countries and the presence of colonial relationship from the CEPII GeoDist database (Mayer and Zignago, 2011). Descriptive statistics and correlations for all indicators described in this section and the variables used in the econometric analysis are reported in the Appendix, distinguishing between two cases: (1) Table A1: 5-years interval data that include 3 time points (1995, 2000, 2005); and (2) Table A2: 3-years interval data that include 5 time points (1995, 1998, 2001, 2004, 2007).

Results: Descriptive Analysis

Given the indicators described so far, we can represent countries in the space defined by both the number of products in which they specialize (the level of diversification, eq. 2), and the average number of countries exporting the products (the level of complexity, eq. 4). Figure 1 shows the

[1] In this case, we exclude from the analysis the islands (Cyprus and Malta).

[2] We use 4-digit rather than 6-digit data, because the computation of conditional probabilities is highly demanding for memory. However, our analysis is more fine-grained than what can be found in previous studies. For instance, Hausmann and Klinger (2007) use a specification with 1,006 products, while Boschma et al. (2013) distinguish between 775 products.

position of all EU and ENP countries in this space. Our results confirm a positive relationship between complexity and diversification (Hidalgo and Hausmann, 2009). Countries with a high level of diversification (i.e. having a comparative advantage in a high number of products) produce also more complex products, that is, products that require rarer capabilities and, therefore, are produced by a low number of countries. However, for our purpose, it is more relevant to notice that most of the ENP countries (in red) are located in the upper left corner (low complexity and diversification) with the notable exceptions of Israel and Russia, while EU countries (in blue) are in the center (mostly EU-12 countries from recent enlargements) and in the downer right corner (mostly old EU-15 countries). Moreover, it also worth to notice that, in 15 years, there are no big changes in the location of countries on this map.

A certain degree of stability characterizes also the findings on density and import density. In order to study their evolution over time, we divided our countries in four groups: old EU countries (EU-15), new accession EU countries (EU-12 new), eastern ENP countries, and southern ENP countries. Figure 2a shows there is a clear difference in the average level of density for the four groups of countries. The old EU-15 countries have the highest level, the other EU-12 countries have an intermediate level, while both the eastern and southern ENP countries have the lowest levels. Moreover, the dynamics of density over time is also interesting: in the old EU-12 countries, it consistently increased over time, while in the other EU-12 countries, it first declined and then increased again starting from 2003. Density shows a decline in the eastern ENP countries but an increase in the southern ENP countries. So, this analysis confirms the insights we got from the previous graph: there are strong differences between groups of countries and slow processes of change over time.

Since density signals that countries are strongly embedded in the network of products, we see that EU countries are in a much denser part of the product space than ENP countries. Figure 2b shows the evolution of import density over time. The most striking characteristic of this graph is that the rank is exactly the same as in the case of density: EU countries have higher import density than

ENP countries, signaling that they are much more embedded in international trade. While the level of import density of EU countries remains substantially constant over time, in both groups of ENP countries, it tends to increase. However, the increase in import density is much steeper for the eastern countries that experienced a decrease in density. This could be a signal of substitution between internal production and imports.

Moving to the issue of diversification, we replicate in our sample the following stylized fact: countries have a higher probability to develop a comparative advantage in products characterized by higher density. Figure 3 presents the probability of developing a comparative advantage in a new product (five years later) for different density ranges in the EU (a) and ENP (b) case, respectively. In both cases, higher levels of density correspond to higher probabilities to develop a comparative advantage in new products. However, there are two important differences between the two groups. First, among the ENP countries, there are no products with density higher than 0.4, while from this level on, EU countries have the highest probability to develop a comparative advantage in new products. Second, for almost all levels of density, ENP countries have a higher probability to develop a comparative advantage in new products.

Interesting details emerge from a more disaggregated representation. In Figure 4, we plot average density in products with no comparative advantage against the number of new products where a comparative advantage has been developed five years later, for three different points in time (a: 1995; b: 2000; c: 2005). A positive relationship is evident in all cases. However, the plots also show a stronger relationship at lower average densities, and a higher variation over time in the number of new products for ENP countries (in red). So, both Figure 3 and Figure 4 hint at the existence of a difference in the effect of density between EU and ENP countries.

What about import density? Remember that the density indicator measures the closeness of a good to the productive structure of a country. Density drives the evolution of countries productive structure, because it is easier for them to move to nearby goods rather than jump far away. The meaning and impact of import density are less clear-cut. A product with high import density is close to goods that are strongly needed in the country: this could be an important incentive for the country to produce it locally and could also provide an opportunity for learning from international trade. However, import density could also signal the lack of significant production capabilities: in this case, high import density would not be a driver for the evolution of the country productive structure, and it could even be associated to a lower probability of developing a comparative advantage in new products. Finally, a low import density might favor within-country production, because it could provide a space sheltered from international competition that could lead to the emergence of a strong national sector.

Analogous to what we have done for density, in Figure 5 we present the probability of developing a comparative advantage in a new product (five years later) for different import density ranges in the EU (a) and ENP (b) case, respectively. The results are quite striking. In the EU case, the probability of developing a comparative advantage in a new product increases strongly with import density. However, in the ENP case, the pattern is far less clear, and the highest probability peak is at very low levels of import density. This suggests that the mechanisms we have mentioned before might have different strengths in different groups of countries, which will be investigated below

Results: Econometric Analysis

All the results presented in the previous section are descriptive in nature. Therefore, we have to perform more formal tests to validate them. Following Hidalgo et al. (2007). we estimate the following econometric equation:

$$x_{i,c,t+k} = \alpha + \gamma x_{i,c,t} + \beta_d d_{i,c,t} + \beta_{id} id_{i,c,t} + \delta_d ENP \cdot d_{i,c,t} + \delta_{id} ENP \cdot id_{i,c,t} + \pi X + \varepsilon_{i,c,t} \quad (10)$$

where the dependent variable takes value 1 if country *c* has a comparative advantage in product *i* at time *t* + *k* (*k* = 3, 5), and zero otherwise, $d_{i,c,t}$ denotes the density around product i in country c at time t, $id_{i,c,t}$denotes import density around product i in country c at time t, ENP is a dummy variable that takes value 1 if the country belongs to the European Neighborhood Policy group, and zero if it belong to the European Union, and X is a vector of country-year and product-year dummy variables, which control for any time-varying country or product characteristic. The coefficients $\delta_d$and δ_{id}capture any eventual difference in the impact of density between EU and ENP countries. Both density and import density are normalized by subtracting the mean and dividing by the standard deviation.

The results obtained from OLS estimation with standard errors clustered at the country level are presented in Table 1. Model 1 presents the results with a 5-years interval between the dependent and the independent variables. Both density and import density have a positive and significant effect. In particular, the positive and significant coefficient of import density suggests that countries tend to diversify also in new industries that are close to their import needs. In model 2, we add interaction effects, to check whether density and import density work differently in EU and ENP countries. In both cases, we can observe significant differences: ENP countries are characterized by a stronger impact of density and no role for import density. The last result is particularly interesting, since it suggests that the mechanisms behind the role of import density might work effectively only in some countries. In models 3 and 4, we check the robustness of our results with a different time specification (a 3-years interval): both density indicators and interactions are weaker in these models, whereas the lagged dependent variable has a stronger effect. This strengthens the idea that density and import density have a stronger impact over longer periods of time.

These results should be carefully interpreted. In particular, the model specified before does not distinguish between the effects of density and import density in keeping a comparative advantage in a certain product and developing a comparative advantage in a new product. Following Hausmann and Klinger (2007) and Boschma et al. (2013), we perform this refined analysis by estimating the following equation:

$$x_{i,c,t+5} = \alpha + \gamma x_{i,c,t} + \beta_d^o\left(x_{i,c,t}\right) \cdot d_{i,c,t} + \beta_d^n\left(1 - x_{i,c,t}\right) \cdot d_{i,c,t} + \beta_{id}^o\left(x_{i,c,t}\right) \cdot id_{i,c,t}$$
$$+ \beta_{id}^n\left(1 - x_{i,c,t}\right) \cdot id_{i,c,t} + \delta_d^o\left(x_{i,c,t}\right) \cdot ENP \cdot d_{i,c,t} + \delta_d^n\left(1 - x_{i,c,t}\right) \cdot ENP \cdot d_{i,c,t}$$
$$+ \delta_{id}^o\left(x_{i,c,t}\right) \cdot ENP \cdot id_{i,c,t} + \delta_{id}^n\left(x_{i,c,t}\right) \cdot ENP \cdot id_{i,c,t} + \pi X + \varepsilon_{i,c,t} \qquad (11)$$

where β_d^o (β_{id}^o) captures the impact of density (import density) in keeping a comparative advantage in product i, β_d^n (β_{id}^n) captures the impact of density (import density) in developing a comparative advantage in a new product, and the δ coefficients capture the existence of any difference in the impact of density and import density across EU and ENP countries. As in the previous case, both density and import density are standardized. The model is estimated using OLS with country-clustered standard errors. Results are presented in Table 2. Model 1 shows that both density and import density have a positive effect on both keeping a comparative advantage in a current product and developing a comparative advantage in a new product. However, consistently with previous findings, the former effect is stronger than the latter: both density and import density play a larger role in keeping a comparative advantage than in developing a new one. In model 3, we introduce the interaction effects: the results confirm that density has a stronger impact in the ENP countries, and this holds in the case of both current products and new ones. However, the impact of import density on keeping current comparative advantage is similar across the two groups of countries (the interaction effect is not significantly different from zero). Finally, while import density plays an important role in the development of a comparative advantage in new products in EU countries, it has no importance in the case of the ENP group, suggesting that the difference in the mechanisms behind import density refers specifically to the creation of a comparative advantage in new products rather than to the retention of existing products. The 3-years interval robustness checks (Model 3 and 4) confirm these outcomes.

Results: The Role of Trade Partners

The results obtained in the previous section suggest that the evolution of the productive structure of countries might depend not only on their past history but also on the trade relationships with other countries. In this section, we explore more in detail this possibility.

Whatever the measure we use, there are two reasons why the productive structure of trade partners might affect the evolution of the productive structure of a country. First, the presence of a comparative advantage signals the centrality of a product in the productive structure of a country: this provides the opportunity and the incentive for trade partners to keep active and even strengthen the trade relationships around the product. Second, a comparative advantage also signals the existence and the widespread diffusion of the capabilities required for a product: trade relationships with partners where these capabilities are strong enough might provide important learning opportunities.

The model we estimate is analogous to the one in equation (11), where we disentangle the effect of density and import density on keeping a comparative advantage in existing products and developing a comparative advantage in new products. We report again the results from this model in Column 1 of Table 3, in order to allow comparisons more easily. To this model, we add the comparative advantage indicator of the most preferred origin and the most preferred destination (Model 2) and the corresponding ENP interactions (Model 3). In Model 4, instead, we use the weighted indicators. Finally, we include the ENP interactions in Model 5.

The first result that can be extracted from Table 3 is that neither the magnitude nor the significance of the main effects and ENP interactions emerging from the previous specifications are affected once we introduce the densities of trade partners. This was not obvious, as they could capture effects similar to those already revealed by the import density of the focal country. Second, in both the most preferred country and the weighted specification, the comparative advantage indicators of trade partners have a positive and significant effect on the probability of keeping a comparative advantage. Third, there is no significant impact of origin countries on the development of new products, while there is a significant effect of destination countries. Fourth, the last result about destination countries does not hold in the case of ENP countries. Finally, all results hold also when considering a 3-years interval (Table 4), with the usual caveat that the effect of densities is smaller and is compensated by a stronger role of the lagged dependent variable. Taken together, these results strongly suggest that opportunities and incentives mechanisms are at work here: they are more powerful in keeping existing products than in developing new ones, and they are also less affected by the peculiar characteristics of the countries. However, some learning-by-exporting effect is also evident, although only in the case of more developed countries, signaling the importance of absorptive capabilities.

Results: Geographical Proximity and Colonial Relations

As it is well known, trade relations are affected by many variables, including geographical proximity, and cultural and historical relations. Therefore, our results on the role of import density might be driven by these factors, and not by the trade relation in itself.

We estimate again the model of Equation (11), but we add the indicator of geographical (Table 5) or colonial links (Table 6). Model 1 in Table 5 shows that the results about import density are only slightly affected by the new specification: the coefficient of keeping a comparative advantage in an existing product category reduces in size, but it is still highly significant. There are even lower differences when considering simple distances (Model 3) rather than common borders. Model 2 and Model 4 show that the role played by geographical proximity is the same in both the EU and the ENP countries.

In the case of colonial relations (Table 6), again, there is no change in the estimated effects of import density. However, an interesting result emerges from Model 2: the colonial link seems to strengthen the diversification process only in the EU countries, not in the ENP countries. With some precaution, we might say that only the former colonizers are able to exploit the colonial links, while for the colonies it does not provide any advantage for the evolution of the productive structure.

These results also hold when considering colonial and geographical relations together (Model 3 to 6 in Table 6) and a 3-years interval (Table 7).

Finally, we also check the robustness of our results by estimating a full model that includes all indicators (density, import density, trade partners, geographical and colonial relations). All results hold also in this model (Table 8), but the difference between EU and ENP countries in the case of colonial relations and only with a 3-years interval.

Conclusions

In this article, we investigated the process of diversification in EU and ENP countries by using the proximity approach developed by Hausmann, Hidalgo and Klinger. Our results confirm the path-dependence in the diversification process: all analyzed countries tend to jump into new industries that are related to their current productive structure, because they can exploit the existing capabilities. However, the effect of density is much stronger in the case of ENP countries, signaling the prominence of different types of capabilities: EU countries are also able to diversify into less related industries because of general-purpose capabilities, while ENP have to rely much more on the relatedness between products and the specific capabilities necessary to produce them.

Moreover, we also show that imports may have an impact on the trajectory of the productive structure of countries, provided that absorptive capabilities exist. In our sample, only EU countries are able to diversify into sectors related to their imports. The productive structure of trade partnershas a lower impact on the diversification process in countries: it provides economic incentives to both EU and ENP countries to keep producing in existing sectors that are related to what their partners do, and it also offers learning opportunities from the exports, at least in the case of EU countries.

Finally, we show that geographical proximity matters in affecting the diversification process: countries have a higher probability to keep or develop a product if a neighbor already has a comparative advantage in it. A similar result holds in the case of colonial links, but only for the EU countries that can exploit their absorptive capabilities.

All these results contribute to the literature on country diversification by showing that, although path dependence matters, there is still the possibility that the network of relations in which countries are embedded might change the direction and the intensity of diversification. Further research should look more specifically at the links between countries, by considering more specific types of cultural relationships. Moreover, what is still missing in our analysis is a detailed account of why differences between countries in terms of general-purpose capabilities exist and persist over time. Institutions like laws, customs, habits and traditions might matter in this respect, as these have an impact on the incentives, frameworks, ideas and behaviors of individuals and organizations. Some institutions directly favor or hinder the emergence of innovations (Lipsey, 2009; von Tunzelmann, 2003). There is actually a strong consensus on the role that institutions play in determining innovation and competitiveness of countries (see e.g. Lundvall 1992; Cantwell, 2005; Menzel and Kammer 2012) and regions (see e.g. Cooke et al., 1997; Storper 1995; Crescenzi and Rodríguez-Pose, 2011). Therefore, we need to assess the impact of country- and region-specific institutions on the process of diversification, and how that has affected the differences in the nature of diversification between EU countries (into less related industries) and ENP countries (into more related products).

Drawing policy implications is a very delicate exercise with respect to the analysis conducted so far. The most striking characteristic emerging from the study of the product space and the diversification process of countries is the strong path-dependence: the productive structure of the past keeps exerting its influence many years later, and the position of countries in the product space, in terms of both diversification and complexity, is very stable over the whole period under analysis. Moreover, also the econometric analysis shows that the effects of density and import density are stronger when considering a 5-years interval. Therefore, policy interventions should take into account that effects might display only over a long time period.

Our results show that in the case of ENP countries, product relatedness measured through density has a stronger effect both in keeping a comparative advantage in existing products and in diversifying into new products. Policy aimed at improving and speeding up the diversification process should consider that in these countries, this could be obtained mostly by favoring the development of nearby sectors. Directly favoring the creation of very distant industries might result in severe failures, since the lack of necessary supporting infrastructure and institutions may doom these initiatives before positive diffusion effects may occur. However, together with these interventions focused on nearby industries, policy makers might also consider actions aimed at improving the quality of the supporting institutions. Creating an environment where firms can emerge and grow more easily or returns from innovation can be better appropriated, might provide stronger incentives and opportunities for diversification even in very far products and therefore boost the future growth of countries.

Our findings on the role of imports and trade partners provide also important insights. While imports provide powerful incentives for both EU and ENP countries to keep producing in existing sectors where they already have comparative advantage, learning effects are circumscribed only to EU countries. In the ENP countries, the availability of a wider variety of inputs or of higher quality products does not produce positive effects, because of the lack of institutions, capabilities and probably demand. This is also the reason why colonial links are not effective in driving the diversification process. Therefore, policy aimed at improving institutions might be very useful also in this respect. Moreover, our result on geographical proximity suggests that the development of new accession countries that are closer to the ENP countries might have beneficial effects on the ENP policy, and that the links that exist because of physical proximity should be carefully exploited. However, more specific policies might also consider trade flows as a whole in these countries: sectors opening to international imports should also be opened very soon to opportunities in exports, so to have the possibility to grow and support the diversification process of countries.

Finally, our results on the role of trade partners do not support any role for general trade policies, at least in ENP countries. These countries do not benefit from the existing productive structures and capabilities of their trade partners: although trade openness might have beneficial effects on countries, our findings suggest that it would not improve diversification by itself.

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Table 1

Determinants of Having a Comparative Advantage in the Future

	(1)	(2)	(3)	(4)
Model	LPM	LPM	LPM	LPM
D.V.	CA_{t+5}	CA_{t+5}	CA_{t+3}	CA_{t+3}
CA_t	0.556**	0.556**	0.62**	0.621**
	(0.0169)	(0.017)	(0.0161)	(0.0161)
Density	0.199**	0.187**	0.172**	0.167**
	(0.0157)	(0.0153)	(0.0138)	(0.0143)
Import Density	0.031**	0.044**	0.015*	0.022**
	(0.012)	(0.0127)	(0.0075)	(0.0084)
ENP * Density		0.04*		0.011
		(0.0192)		(0.0162)
ENP * Import Density		-0.042**		-0.024*
		(0.015)		(0.01)
Observations	156,366	156,366	260,568	260,568
R-squared	0.5189	0.5191	0.5752	0.5752

Country-clustered standard errors in parentheses.
All models include country-year and product-year dummy variables.
**,*,+ statistically significant at .01, .05 and .10 percent respectively.

Table 2

Determinants of Having a Comparative Advantage in the Future:
Keeping a Current Product and Developing a New Product

	(1)	(2)	(3)	(4)
Model	LPM	LPM	LPM	LPM
D.V.	CA_{t+5}	CA_{t+5}	CA_{t+3}	CA_{t+3}
CA_t	0.531**	0.527**	0.593**	0.597**
	(0.0157)	(0.0182)	(0.0148)	(0.0177)
Density on Current	0.202**	0.177**	0.176**	0.153**
	(0.0181)	(0.0172)	(0.0158)	(0.0147)
Density on New	0.168**	0.129**	0.139**	0.108**
	(0.0148)	(0.0118)	(0.0125)	(0.01)
Import Density on Current	0.064**	0.082**	0.05**	0.058**
	(0.0158)	(0.0145)	(0.0119)	(0.0116)
Import Density on New	0.031*	0.051**	0.014+	0.029**
	(0.013)	(0.0114)	(0.0083)	(0.0072)
ENP * Density on Current		0.118**		0.116**
		(0.0404)		(0.0403)
ENP * Density on New		0.123**		0.094**
		(0.0199)		(0.0174)
ENP * Imp. Density on Current		-0.041		-0.011
		(0.0347)		(0.0292)
ENP * Imp. Density on New		-0.057**		-0.038**
		(0.0158)		(0.011)
Observations	156,366	156,366	260,568	260,568
Adjusted R-squared	0.5214	0.5223	0.5781	0.5788

Country-clustered standard errors in parentheses.
All models include country-year and product-year dummy variables.
**,*,+ statistically significant at .01, .05 and .10 percent respectively.

Table 3

The effects of most preferred countries and weighted comparative advantage.
5-years Interval

	(1)	(2)	(3)	(4)	(5)
Model	LPM	LPM	LPM	LPM	LPM
D.V.	CA_{t+5}	CA_{t+5}	CA_{t+5}	CA_{t+5}	CA_{t+5}
		Most Preferred Countries		Weighted	
CA_t	0.527**	0.497**	0.495**	0.467**	0.466**
	(0.0182)	(0.016)	(0.0178)	(0.0184)	(0.02)
Density on Current	0.177**	0.197**	0.175**	0.199**	0.176**
	(0.0172)	(0.0177)	(0.0181)	(0.0175)	(0.0182)
Density on New	0.129**	0.165**	0.128**	0.167**	0.129**
	(0.0118)	(0.0145)	(0.0118)	(0.0144)	(0.0118)
Import Density on Current	0.082**	0.057**	0.073**	0.052**	0.066**
	(0.0145)	(0.0155)	(0.0148)	(0.0155)	(0.0151)
Import Density on New	0.051**	0.027*	0.045**	0.026*	0.041**
	(0.0114)	(0.0126)	(0.0113)	(0.0124)	(0.011)
CA_t of Destination		0.037**	0.04**	0.058**	0.068**
on Current		(0.0066)	(0.0074)	(0.012)	(0.0134)
CA_t of Destination		0.016**	0.018**	0.025**	0.034**
on New		(0.0022)	(0.0029)	(0.0043)	(0.0065)
CA_t of Origin		0.035**	0.03*	0.08**	0.073**
on Current		(0.0099)	(0.0129)	(0.0164)	(0.0205)
CA_t of Origin		-0.001	-0.001	-0.002	-0.001
on New		(0.0024)	(0.0038)	(0.0033)	(0.0058)
ENP * Density on Current	0.118**		0.114**		0.112**
	(0.0404)		(0.0389)		(0.0386)
ENP * Density on New	0.123**		0.116**		0.116**
	(0.0199)		(0.0173)		(0.0181)
ENP * Imp. Density on Current	-0.041		-0.036		-0.032
	(0.0347)		(0.0336)		(0.0336)
ENP * Imp. Density on New	-0.057**		-0.05**		-0.044**
	(0.0158)		(0.016)		(0.0158)
ENP * CA_t of Destination			-0.01		-0.026
on Current			(0.0157)		(0.0246)
ENP * CA_t of Destination			-0.01+		-0.025**
on New			(0.0053)		(0.0087)
ENP * CA_t of Origin			0.012		0.009
on Current			(0.0229)		(0.03)
ENP * CA_t of Origin			0.0001		-0.002
on New			(0.0058)		(0.0086)
Observations	156,366	156,366	156,366	156,366	156,366
Adjusted R-squared	0.5223	0.5223	0.5232	0.5225	0.5235

Country-clustered standard errors in parentheses.
All models include country-year and product-year dummy variables.
**.*,+ statistically significant at .01, .05 and .10 percent respectively.

Table 4

The effects of most preferred countries and weighted comparative advantage
3-years Interval

	(1)	(2)	(3)	(4)	(5)
Model	LPM	LPM	LPM	LPM	LPM
D.V.	CA_{t+3}	CA_{t+3}	CA_{t+3}	CA_{t+3}	CA_{t+3}
		Most Preferred Countries		Weighted	
CA_t	0.597**	0.562**	0.567**	0.539**	0.545**
	(0.0177)	(0.0152)	(0.0179)	(0.0167)	(0.0191)
Density on Current	0.153**	0.172**	0.148**	0.173**	0.149**
	(0.0147)	(0.0154)	(0.0153)	(0.0151)	(0.0156)
Density on New	0.108**	0.137**	0.106**	0.138**	0.107**
	(0.01)	(0.0123)	(0.0097)	(0.0122)	(0.0098)
Import Density on Current	0.058**	0.045**	0.051**	0.041**	0.045**
	(0.0116)	(0.0116)	(0.0121)	(0.0116)	(0.0125)
Import Density on New	0.029**	0.012	0.024**	0.01	0.021**
	(0.0072)	(0.0081)	(0.007)	(0.0079)	(0.0067)
CA_t of Destination		0.03**	0.029**	0.053**	0.056**
on Current		(0.0048)	(0.0049)	(0.0099)	(0.0109)
CA_t of Destination		0.014**	0.016**	0.025**	0.032**
on New		(0.0022)	(0.0023)	(0.0046)	(0.0056)
CA_t of Origin		0.034**	0.036**	0.066**	0.067**
on Current		(0.0073)	(0.0096)	(0.0136)	(0.0169)
CA_t of Origin		-0.002	-0.002	-0.002	-0.004
on New		(0.0018)	(0.0031)	(0.0028)	(0.0054)
ENP * Density on Current	0.116**		0.118**		0.117**
	(0.0403)		(0.0373)		(0.0368)
ENP * Density on New	0.094**		0.095**		0.096**
	(0.0174)		(0.0144)		(0.014)
ENP * Imp. Density on Current	-0.011		-0.008		-0.005
	(0.0292)		(0.0278)		(0.0278)
ENP * Imp. Density on New	-0.038**		-0.034**		-0.03**
	(0.011)		(0.0113)		(0.0112)
ENP * CA_t of Destination			0.003		-0.006
on Current			(0.0144)		(0.0212)
ENP * CA_t of Destination			-0.006		-0.017*
on New			(0.0048)		(0.0082)
ENP * CA_t of Origin			-0.01		-0.014
on Current			(0.0186)		(0.0264)
ENP * CA_t of Origin			0.001		0.003
on New			(0.0051)		(0.0082)
Observations	260,568	260,568	260,568	260,568	260,568
Adjusted R-squared	0.5788	0.5788	0.5795	0.579	0.5797

Country-clustered standard errors in parentheses.
All models include country-year and product-year dummy variables.
**.*,+ statistically significant at .01, .05 and .10 percent respectively.

Table 5

Determinants of Having a Comparative Advantage in the Future:
The Role of Geographic Variables

	(1)	(2)	(3)	(4)
Model	LPM	LPM	LPM	LPM
D.V.	CA_{t+5}	CA_{t+3}	CA_{t+5}	CA_{t+3}
	Contiguous Neighbors		Nearest Four Neighbors	
CA_t	0.542**	0.614**	0.528**	0.598**
	(0.0185)	(0.0167)	(0.018)	(0.0175)
Density on Current	0.167**	0.142**	0.169**	0.146**
	(0.0156)	(0.013)	(0.0166)	(0.0138)
Density on New	0.117**	0.096**	0.119**	0.099**
	(0.0107)	(0.0091)	(0.0119)	(0.0096)
Import Density on Current	0.069**	0.045**	0.079**	0.056**
	(0.0137)	(0.0101)	(0.0141)	(0.0113)
Import Density on New	0.051**	0.028**	0.049**	0.027**
	(0.0099)	(0.0059)	(0.011)	(0.0069)
ENP * Density on Current	0.117**	0.118**	0.118**	0.117**
	(0.0409)	(0.0406)	(0.0407)	(0.0401)
ENP * Density on New	0.118**	0.092**	0.123**	0.095**
	(0.0192)	(0.0163)	(0.0205)	(0.0182)
ENP * Imp. Density on Current	-0.031	0.0003	-0.042	-0.011
	(0.0323)	(0.0254)	(0.0338)	(0.0282)
ENP * Imp. Density on New	-0.06**	-0.039**	-0.057**	-0.039**
	(0.0144)	(0.0099)	(0.0155)	(0.0107)
CA_t Neighbor	0.023**	0.023**	0.02**	0.019**
	(0.0047)	(0.004)	(0.0034)	(0.0027)
ENP * CA_t Neighbor	0.001	-0.004	0.002	-0.0002
	(0.0076)	(0.0061)	(0.0064)	(0.0055)
Observations	148,920	248,160	156,366	260,568
Adjusted R-squared	0.53	0.587	0.5227	0.5792

Country-clustered standard errors in parentheses.
All models include country-year and product-year dummy variables.
**.*,+ statistically significant at .01, .05 and .10 percent respectively.

Table 6

Determinants of Having a Comparative Advantage in the Future:
The Role of Institutional Variables

	(1)	(2)	(3)	(4)	(5)	(6)
Model	LPM	LPM	LPM	LPM	LPM	LPM
D.V.	CA_{t+5}	CA_{t+5}	CA_{t+5}	CA_{t+5}	CA_{t+5}	CA_{t+5}
	Colonial Link		Colonial Link and Contiguous Neighbors		Colonial Link and Nearest Four Neighbors	
CA_t	0.527**	0.527**	0.543**	0.543**	0.528**	0.528**
	(0.0185)	(0.0185)	(0.0191)	(0.019)	(0.0184)	(0.0184)
Density on Current	0.175**	0.175**	0.163**	0.165**	0.165**	0.166**
	(0.0162)	(0.016)	(0.0145)	(0.0144)	(0.0154)	(0.0152)
Density on New	0.125**	0.125**	0.113**	0.114**	0.114**	0.115**
	(0.0107)	(0.0104)	(0.01)	(0.0099)	(0.0107)	(0.0107)
Import Density on Current	0.081**	0.078**	0.069**	0.066**	0.079**	0.076**
	(0.0149)	(0.015)	(0.0141)	(0.0143)	(0.0145)	(0.0146)
Import Density on New	0.05**	0.047**	0.051**	0.048**	0.048**	0.046**
	(0.0113)	(0.0114)	(0.0098)	(0.0101)	(0.0109)	(0.0108)
ENP * Density on Current	0.124**	0.125**	0.122**	0.122**	0.123**	0.123**
	(0.04)	(0.0404)	(0.0401)	(0.0408)	(0.0397)	(0.0404)
ENP * Density on New	0.131**	0.132**	0.124**	0.123**	0.13**	0.129**
	(0.0198)	(0.0198)	(0.0195)	(0.0194)	(0.0194)	(0.0204)
ENP * Imp. Density on Current	-0.042	-0.038	-0.032	-0.029	-0.043	-0.04
	(0.0357)	(0.0352)	(0.0333)	(0.0325)	(0.0352)	(0.0339)
ENP * Imp. Density on New	-0.058**	-0.054**	-0.061**	-0.058**	-0.058**	-0.055**
	(0.0159)	(0.0159)	(0.0143)	(0.0143)	(0.0157)	(0.0153)
CA_t Neighbor			0.022**	0.018**	0.019**	0.017**
			(0.0034)	(0.0047)	(0.0026)	(0.0033)
ENP * CA_t Neighbor				0.006		0.004
				(0.0078)		(0.0063)
CA_t Colonial Link	0.015**	0.022**	0.011**	0.02**	0.012**	0.019**
	(0.0037)	(0.0043)	(0.0034)	(0.0042)	(0.0035)	(0.004)
ENP * CA_t Colonial Link		-0.017**		-0.018**		-0.016*
		(0.0066)		(0.0064)		(0.0065)
Observations	152,643	152,643	145,197	145,197	152,643	152,643
Adjusted R-squared	0.5253	0.5253	0.5331	0.5332	0.5256	0.5256

Country-clustered standard errors in parentheses.
All models include country-year and product-year dummy variables.
**.*,+ statistically significant at .01, .05 and .10 percent respectively.

Table 7

Determinants of Having a Comparative Advantage in the Future:
The Role of Geographic and Institutional Variables
3-years Interval

	(1)	(2)	(3)	(4)
Model	LPM	LPM	LPM	LPM
D.V.	CA_{t+3}	CA_{t+3}	CA_{t+3}	CA_{t+3}
	Contiguous Neighbors		Nearest Four Neighbors	
CA_t	0.615**	0.615**	0.599**	0.599**
	(0.0171)	(0.0171)	(0.0179)	(0.0179)
Density on Current	0.14**	0.141**	0.144**	0.144**
	(0.0124)	(0.0122)	(0.013)	(0.0128)
Density on New	0.095**	0.095**	0.096**	0.096**
	(0.0084)	(0.0086)	(0.0086)	(0.0087)
Import Density on Current	0.044**	0.042**	0.055**	0.053**
	(0.0105)	(0.0105)	(0.0118)	(0.0118)
Import Density on New	0.027**	0.025**	0.026**	0.024**
	(0.006)	(0.0061)	(0.007)	(0.0069)
ENP * Density on Current	0.12**	0.121**	0.12**	0.12**
	(0.0403)	(0.0405)	(0.0398)	(0.0399)
ENP * Density on New	0.094**	0.094**	0.099**	0.098**
	(0.0163)	(0.0166)	(0.0173)	(0.0184)
ENP * Imp. Density on Current	-0.0001	0.002	-0.011	-0.009
	(0.0265)	(0.0257)	(0.0297)	(0.0285)
ENP * Imp. Density on New	-0.041**	-0.038**	-0.039**	-0.037**
	(0.0099)	(0.0099)	(0.011)	(0.0106)
CA_t Neighbor	0.019**	0.018**	0.017**	0.016**
	(0.0028)	(0.004)	(0.0023)	(0.0029)
ENP * CA_t Neighbor		0.001		0.002
		(0.006)		(0.0055)
CA_t Colonial Link	0.011**	0.016**	0.012**	0.016**
	(0.0028)	(0.0032)	(0.0029)	(0.0032)
ENP * CA_t Colonial Link		-0.011+		-0.01+
		(0.0057)		(0.0059)
Observations	241,956	241,956	254,364	254,364
Adjusted R-squared	0.5895	0.5896	0.5815	0.5815

Country-clustered standard errors in parentheses.
All models include country-year and product-year dummy variables.
**.*,+ statistically significant at .01, .05 and .10 percent respectively.

Table 8

Full Model

	(1)	(2)	(3)	(4)
Model	LPM	LPM	LPM	LPM
D.V.	CA_{t+5}	CA_{t+3}	CA_{t+5}	CA_{t+3}
	Contiguous Neighbors		Nearest Four Neighbors	
CA_t	0.482**	0.562**	0.468**	0.547**
	(0.0212)	(0.0183)	(0.0202)	(0.0192)
Density on Current	0.163**	0.135**	0.166**	0.141**
	(0.0159)	(0.0131)	(0.0163)	(0.0138)
Density on New	0.118**	0.096**	0.118**	0.098**
	(0.0096)	(0.0081)	(0.0105)	(0.0084)
Import Density on Current	0.054**	0.032**	0.065**	0.044**
	(0.0151)	(0.0114)	(0.0155)	(0.0129)
Import Density on New	0.043**	0.022**	0.039**	0.02**
	(0.0096)	(0.0055)	(0.0106)	(0.0065)
(Weighted) CA_t	0.058**	0.049**	0.058**	0.048**
of Destination on Current	(0.0142)	(0.0102)	(0.0128)	(0.0103)
(Weighted) CA_t	0.029**	0.029**	0.027**	0.026**
of Destination on New	(0.0074)	(0.006)	(0.0065)	(0.0059)
(Weighted) CA_t	0.077**	0.072**	0.07**	0.066**
of Origin on Current	(0.0198)	(0.0161)	(0.0208)	(0.0167)
(Weighted) CA_t	-0.007	-0.011+	-0.005	-0.007
of Origin on New	(0.007)	(0.0061)	(0.006)	(0.0054)
ENP * Density on Current	0.12**	0.125**	0.117**	0.121**
	(0.0387)	(0.0364)	(0.0383)	(0.036)
ENP * Density on New	0.119**	0.099**	0.121**	0.1**
	(0.0167)	(0.013)	(0.0173)	(0.01367)
ENP * Imp. Density on Current	-0.024	0.005	-0.034	-0.006
	(0.0321)	(0.0252)	(0.0331)	(0.0274)
ENP * Imp. Density on New	-0.051**	-0.034**	-0.047**	-0.032**
	(0.0143)	(0.01)	(0.0154)	(0.011)
ENP * (Weighted) CA_t	-0.02	-0.003	-0.02	-0.001
of Destination on Current	(0.0259)	(0.0206)	(0.025)	(0.0208)
ENP * (Weighted) CA_t	-0.021*	-0.015+	-0.021*	-0.014+
of Destination on New	(0.0096)	(0.0084)	(0.0087)	(0.0082)
ENP * (Weighted) CA_t	-0.005	-0.029	0.007	-0.017
of Origin on Current	(0.0301)	(0.0259)	(0.0308)	(0.0269)
ENP * (Weighted) CA_t	0.003	0.008	-0.0004	0.003
of Origin on New	(0.0092)	(0.0082)	(0.0087)	(0.008)
CA_t Neighbor	0.012*	0.013**	0.013**	0.012**
	(0.0049)	(0.0038)	(0.0033)	(0.0027)
ENP * CA_t Neighbor	0.012	0.005	0.008	0.005
	(0.0076)	(0.0057)	(0.0061)	(0.0052)
CA_t Colonial Link	0.017**	0.014**	0.016**	0.014**
	(0.0039)	(0.0032)	(0.0038)	(0.0031)
ENP * CA_t Colonial Link	-0.016*	-0.009	-0.014*	-0.008
	(0.0067)	(0.006)	(0.0069)	(0.0061)
Observations	145,197	241,956	152,643	254,364
Adjusted R-squared	0.5341	0.5903	0.5266	0.5822

Country-clustered standard errors in parentheses.
All models include country-year and product-year dummy variables.
**.*,+ statistically significant at .01, .05 and .10 percent respectively.

Table A1

Summary Statistics and Correlations

5-years Interval

Variable	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
CA_t (1)	0.216	0.411	1										
CA_{t+5} (2)	0.222	0.416	0.687	1									
Density (3)	0.232	0.133	0.449	0.403	1								
Import Density (4)	0.363	0.09	0.279	0.262	0.722	1							
(Weighted) CA_t of Destination (5)	0.243	0.3	0.223	0.211	0.281	0.276	1						
(Weighted) CA_t of Origin (6)	0.608	0.324	0.147	0.151	0.291	0.317	0.313	1					
(MPC) CA_t of Destination (7)	0.265	0.441	0.189	0.184	0.25	0.228	0.851	0.261	1				
(MPC) CA_t of Origin (8)	0.673	0.469	0.117	0.121	0.255	0.259	0.253	0.847	0.221	1			
CA_t Neighbor – Contiguous (9)	0.492	0.5	0.245	0.234	0.33	0.31	0.29	0.252	0.243	0.198	1		
CA_t Neighbor – Nearest Four (10)	0.503	0.5	0.24	0.228	0.239	0.26	0.282	0.238	0.221	0.172	0.537	1	
CA_t Colonial Link (11)	0.381	0.486	0.118	0.112	0.11	0.123	0.183	0.229	0.147	0.179	0.211	0.208	1

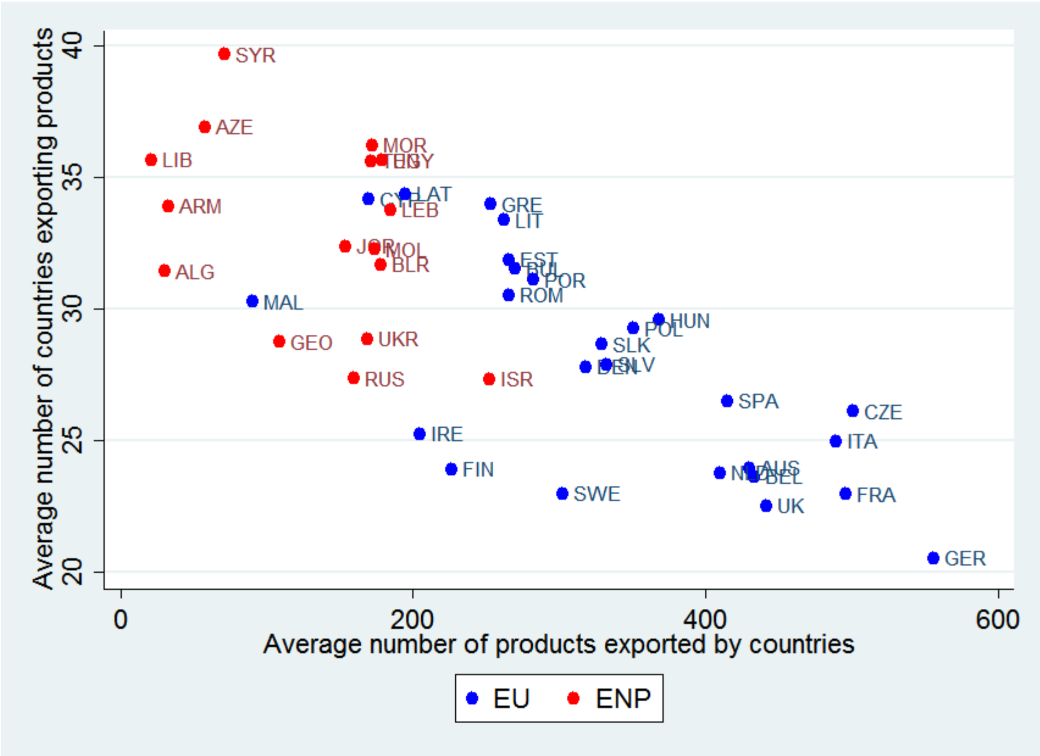
Table A2

Summary Statistics and Correlations

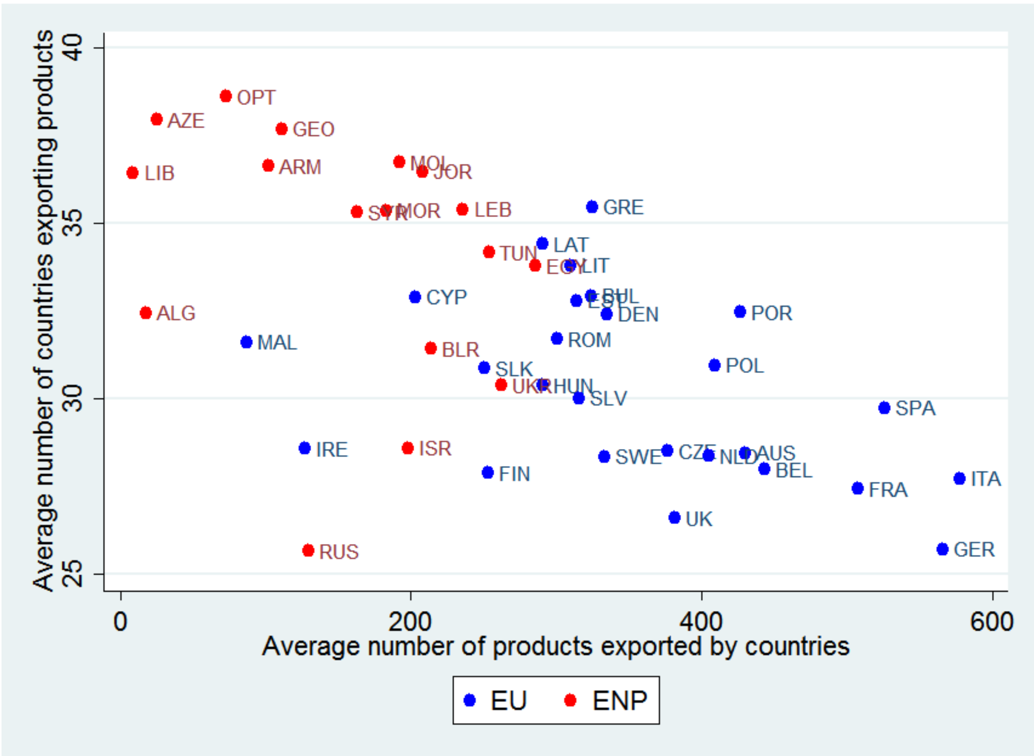
3-years Interval

Variable	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
CA_t (1)	0.216	0.412	1										
CA_{t+3} (2)	0.22	0.414	0.735	1									
Density (3)	0.233	0.13	0.448	0.412	1								
Import Density (4)	0.361	0.087	0.283	0.27	0.724	1							
(Weighted) CA_t of Destination (5)	0.243	0.298	0.225	0.216	0.283	0.28	1						
(Weighted) CA_t of Origin (6)	0.608	0.32	0.147	0.148	0.28	0.302	0.308	1					
(MPC) CA_t of Destination (7)	0.258	0.438	0.19	0.185	0.25	0.231	0.849	0.254	1				
(MPC) CA_t of Origin (8)	0.66	0.474	0.116	0.118	0.245	0.246	0.247	0.843	0.213	1			
CA_t Neighbor – Contiguous (9)	0.492	0.5	0.244	0.238	0.327	0.304	0.294	0.256	0.243	0.2	1		
CA_t Neighbor – Nearest Four (10)	0.504	0.5	0.236	0.229	0.234	0.254	0.285	0.2397	0.222	0.173	0.537	1	
CA_t Colonial Link (11)	0.38	0.485	0.119	0.117	0.113	0.125	0.188	0.232	0.147	0.179	0.211	0.208	1

Figure 1. Relation between the level of diversification of countries and the level of complexity of the products in which they have a comparative advantage, with t = 1995 (a) and t = 2010 (b)

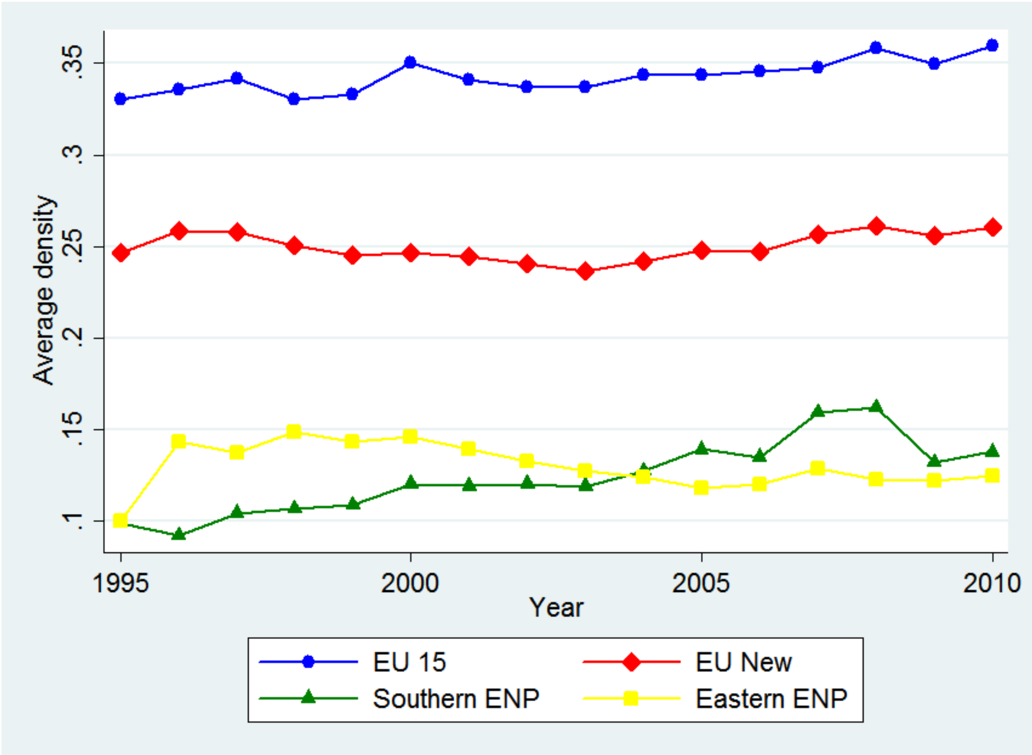


(a)

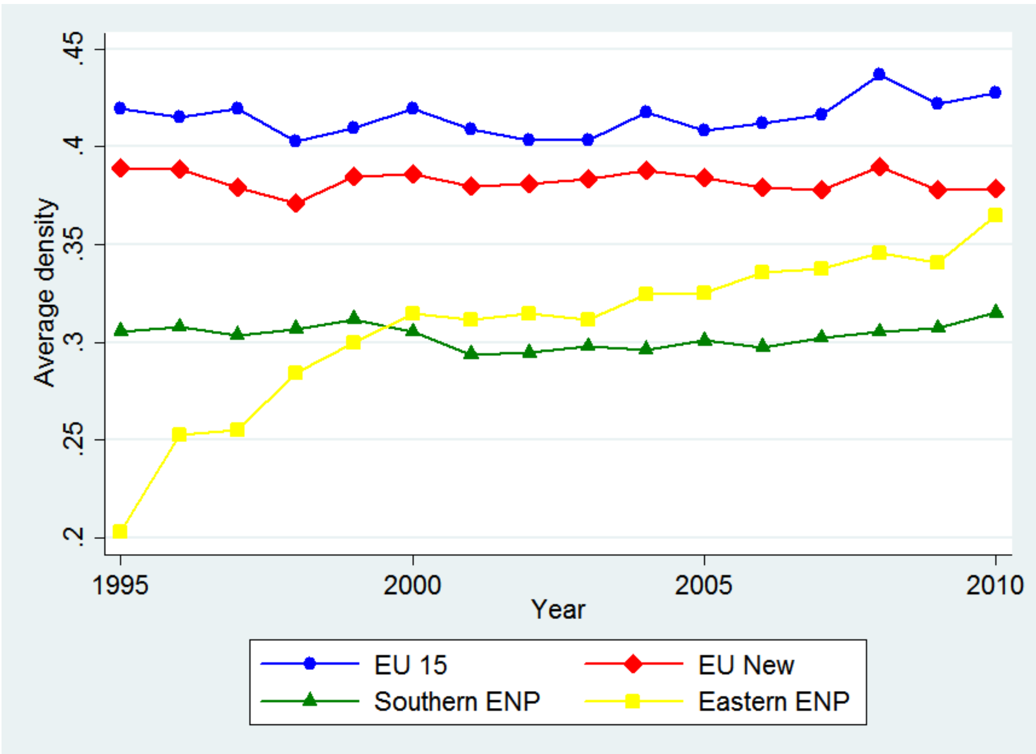


(b)

Figure 2. Evolution of density (a) and import density (b) for EU 15, new EU countries, southern ENP countries and eastern ENP countries.

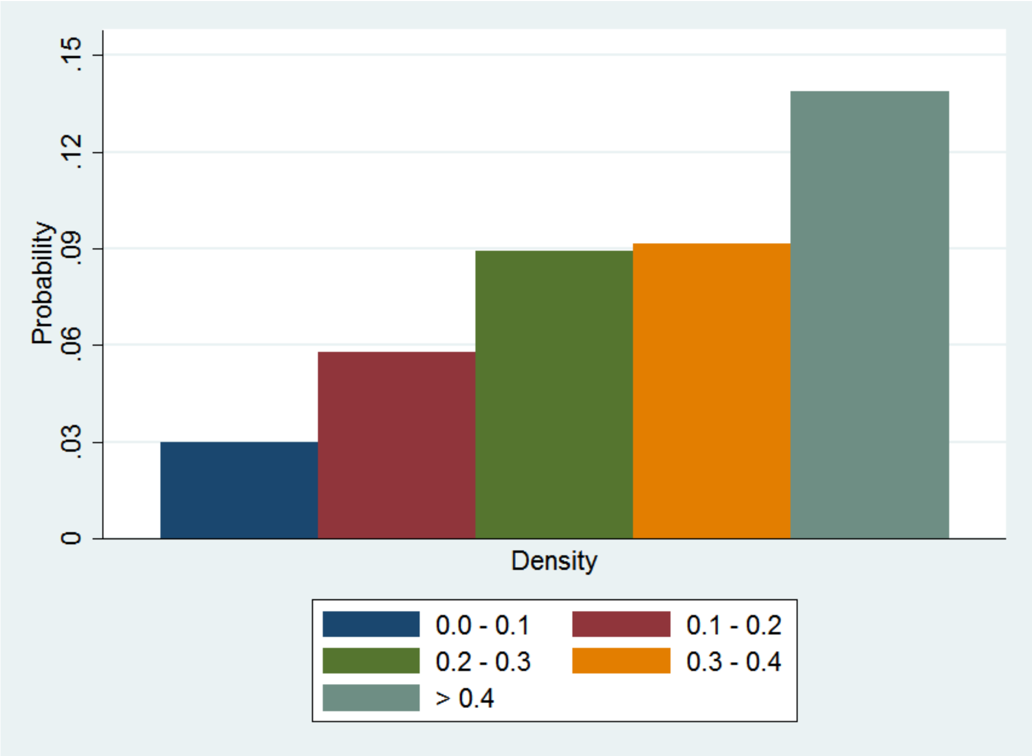


(a)

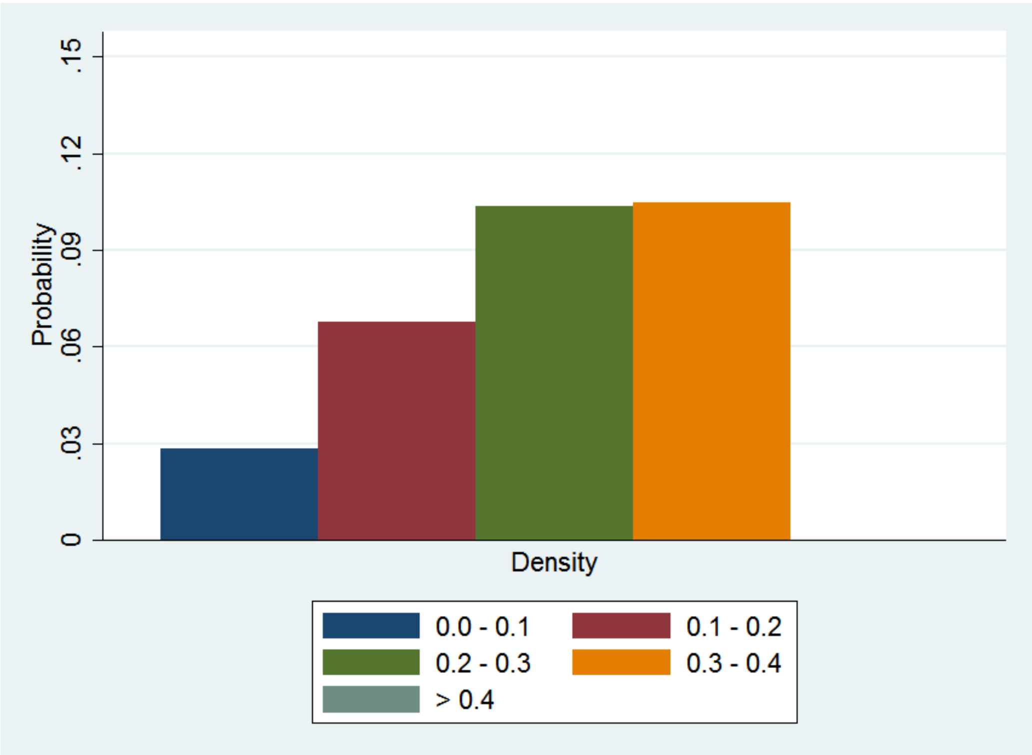


(b)

Figure 3. Probability of developing a comparative advantage in a new product (five years later) for different density ranges in the EU (a) and ENP (b) countries.

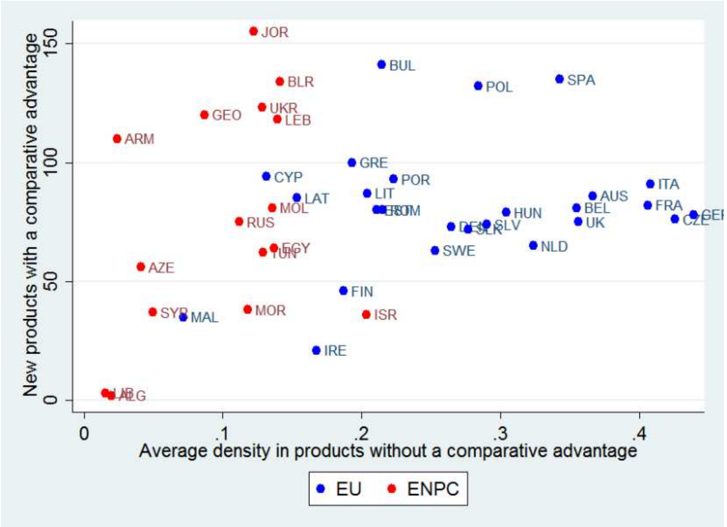


(a)

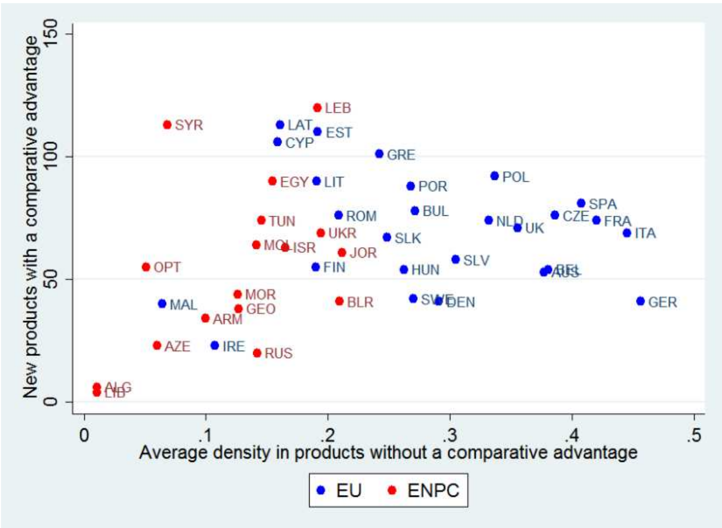


(b)

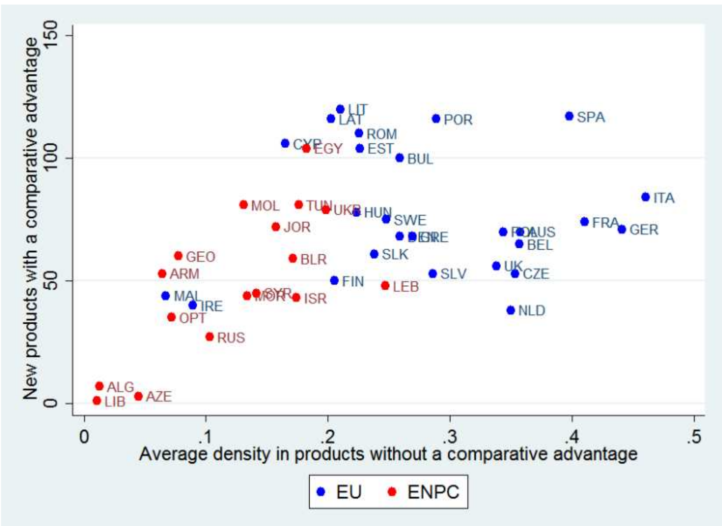
Figure 4. The relationship between density in products without a comparative advantage at time *t* and new products with a comparative advantage at time *t* + 5 in EU and ENP countries, with t = 1995 (a), t = 2000 (b), t = 2005 (c).



(a)

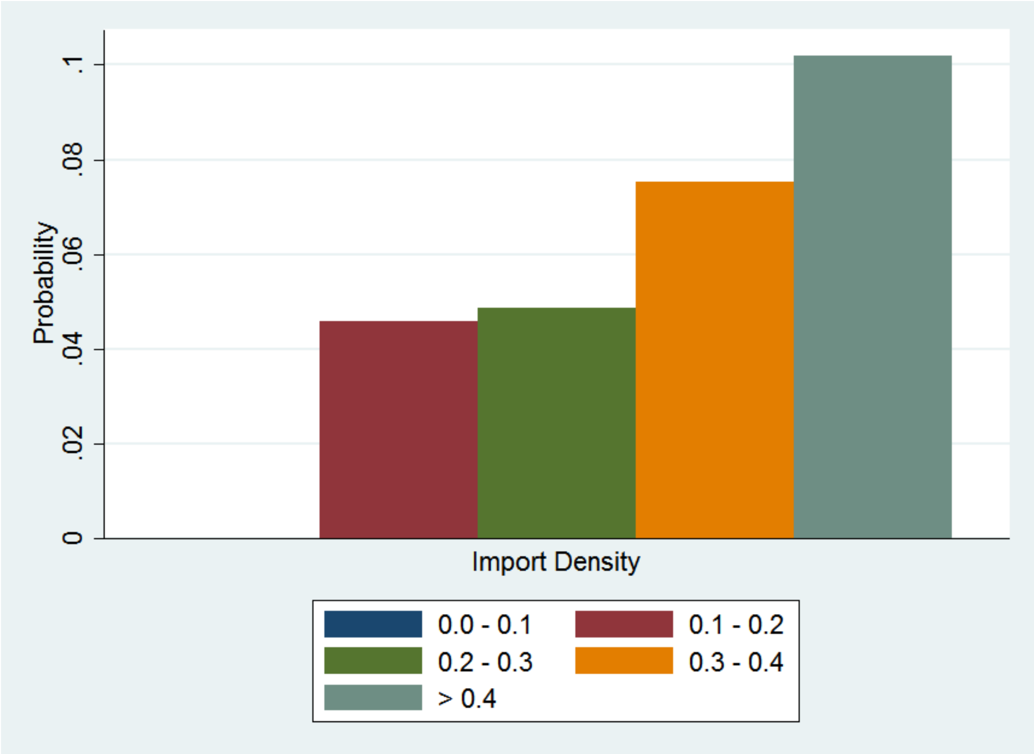


(b)

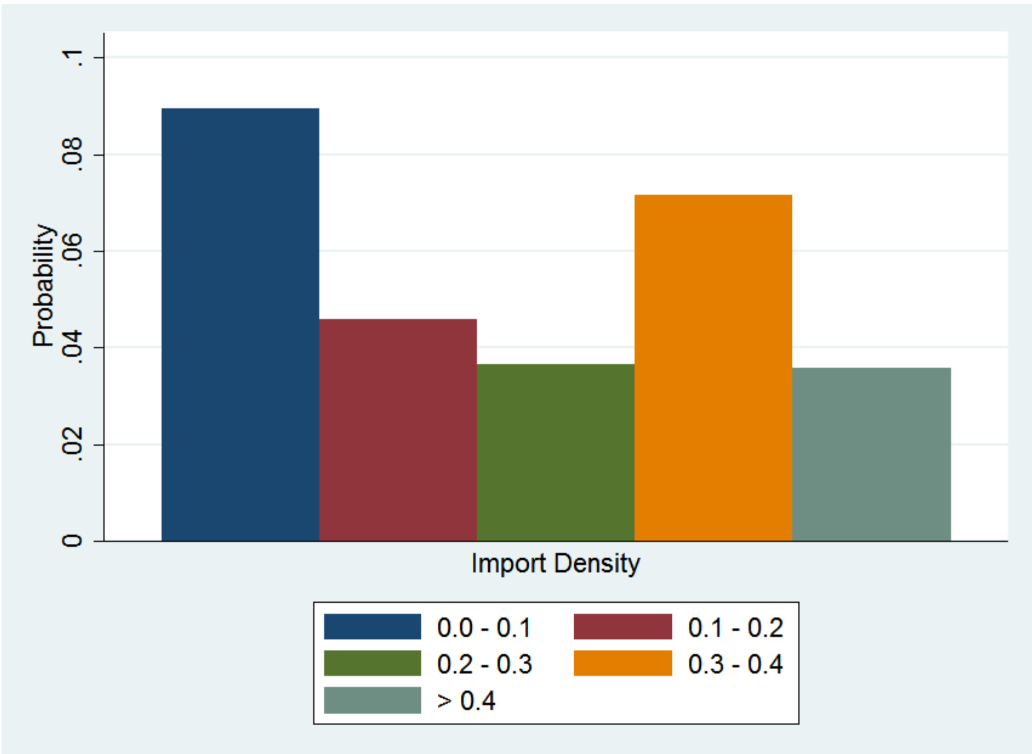


(c)

Figure 5. Probability of developing a comparative advantage in a new product (five years later) for different import density ranges in the EU (a) and ENP (b) countries.



(a)



(b)